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# Army Nonlethal Scalable Effects Center



## Army Nonlethal Weapons APBI

21 September 2017





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# Agenda



- **Capability Needs Analysis (CNA)**
- **CNA in Capabilities Development**
- **Recommended Solution Approaches**
- **Army Expeditionary Warfighting Experiment (AEWE)**
- **Near Term Nonlethal Systems**
- **Summary/Wrap-Up**
- **Rapid Equipping Force – Malodorous Round**

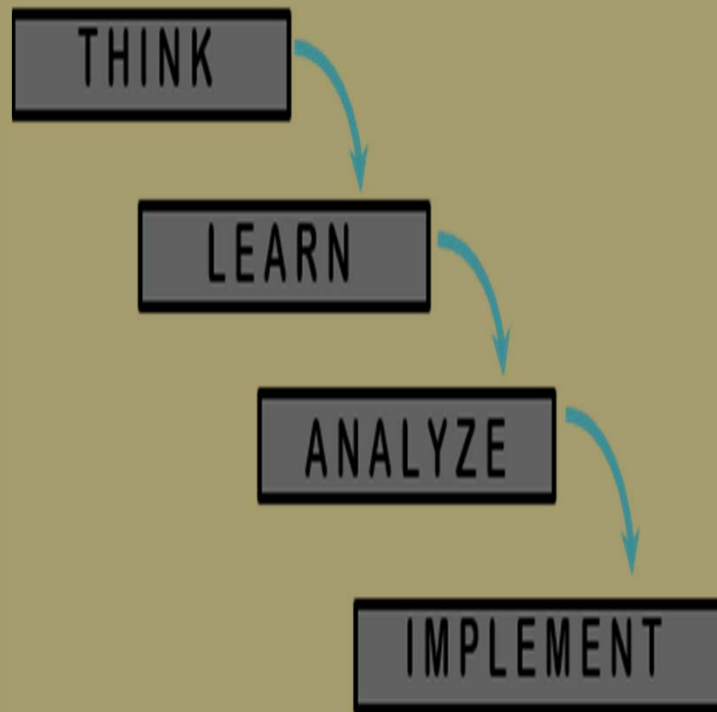


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# Capability Needs Analysis (CNA)

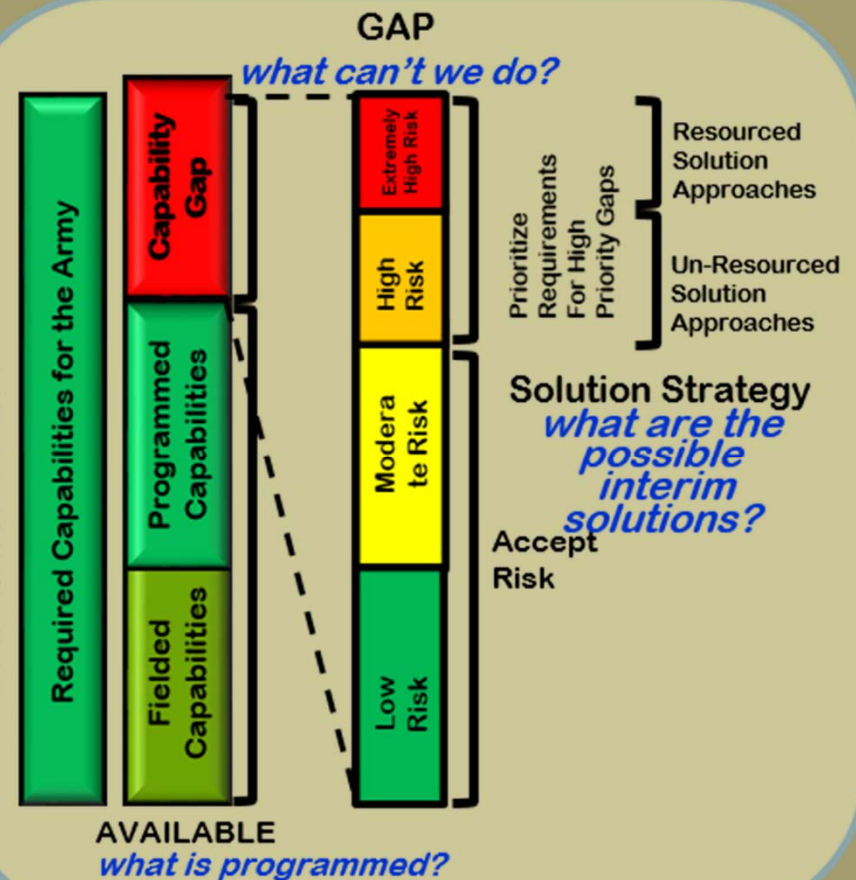


CNA is the analytical underpinning for TRADOC's input to the Army budget and prioritization of capabilities developments



CAPABILITY  
NEEDED

*what must we do?*





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# FY 16 CNA AWFCs to Gaps to Nonlethal Weapons Recommended Solution Approaches (RSA)



Army Warfighting Challenge	NLW Recommended Solution Approach (RSA)
1. Develop Situational Understanding	Vehicle Stopper / Vessel Stopper
11. Conduct Air-Ground Reconnaissance and Security Operations	Vehicle Stopper / Vessel Stopper
12. Conduct Joint Expeditionary Maneuver and Entry Operations	Active Denial Technology
	Vehicle Stopper / Vessel Stopper
	Individual Nonlethal System
13. Conduct Wide Area Security	Active Denial Technology
	Vehicle Stopper / Vessel Stopper
	Individual Nonlethal System
14. Ensure Interoperability and Operate in a Joint, Inter-organizational, and Multinational Environment	Active Denial Technology
15. Conduct Joint Combined Arms Maneuver	Active Denial Technology
	Vehicle Stopper / Vessel Stopper
	Individual Nonlethal System
16. Set the Theater, Sustain Operations, & Maintain Freedom of Movement	Active Denial Technology
	Vehicle Stopper / Vessel Stopper
	Individual Nonlethal System
20. Develop Capable Formations	Vehicle Stopper / Vessel Stopper





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# AEWE Overview



The Army Expeditionary Warrior Experiments Campaign of Experimentation (AEWE) is TRADOC's annual, live, force-on-force prototype experiment.

- Places technologies into the hands of Soldiers for early and credible feedback from the end-user.
- Provides an opportunity to apply lessons learned and validate changes in design.
- Informs future concepts, organizations and requirements.



Previous AEWE FY16/17 nonlethal weapons specific participants included: Safariland, BML Tools, Pepperball & ARDEC Submissions

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# General Experiment Information



- AEWE is an unclassified experiment. Classified technologies will not be accepted.
- All costs of preparing, submitting and presenting submissions for the experiment are solely those of the submitter.
- All costs associated with participating in the experiment to include travel, shipping, technical training costs, technical integration costs, technology maintenance and sustainment costs are the responsibility of the submitter.
- Selected technologies must sign a Vendor Demonstration Agreement (VDA) in order to participate in the experiment. The VDA is an agreement with the vendor and U.S. Government that states the following:
  - 1. Participating in experiment in any way does NOT obligate the U.S. Government to purchase or otherwise acquire the items or services demonstrated or displayed.**
  2. U.S. Government assumes NO cost or obligation, expressed or implied, for damage to, destruction of, or loss of any vendor provided equipment or material used in the experiment.
  3. The U.S. government is NOT responsible for any lodging, transportation or meals and incidental expenses incurred by technology providers during the experiment.
  4. U.S. Government is NOT bound nor obligated in any way to give any special consideration to the vendor on future contracts as a result of this experiment.
  5. Display of vendor's product, its capabilities, and the presentation of any technical data associated with it may involve the participation of foreign military personnel assigned as liaisons to the U.S. Army and other components of the Department of Defense (DoD), as well as personnel of U.S. coalition partners. Such displays and disclosures may be considered an "export" of technical data under the International Traffic in Arms Regulations (ITAR), 22 CFR Chapter I, Subchapter M.



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# Nonlethal Scalable Effects Strategy



Recommended Solution Approaches to Gap:  
**Vehicle Stopper and Individual Nonlethal System**  
(Proposed)



Directed Energy Scalable  
(Nonlethal to Lethal)

2050

Directed Energy Multipurpose

Counter Materiel  
Blunt Trauma to Directed Energy  
Counter Personnel



Radio Frequency  
Vehicle Stopper



Nonlethal Medium Wheeled  
Vehicle Stopping System



Individual Nonlethal  
System



Mounted Active Denial Technology



Counter UAS



Forecheck  
Counter  
Personnel

Recommended Solution Approach to Gap:  
**Active Denial Technology**

2016



12 gauge NL Extended Range  
Marking Munition



40mm Tactical Nonlethal  
Munition

Kinetic/Blunt Trauma/Directed Energy

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Near (FY16-25)

Mid (FY26-35)

Far (FY36-50)



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# Near Term Nonlethal Systems



## Single Net Solution – Remote Deployment Device (SNS-RDD)

Key Required Capability	Threshold	Objective
Stop A Wheeled Vehicle	Captures wheeled vehicles weighing up to 22,000 lbs, at speeds of up to 30 mph, within 200 feet of deployment	38,000 lbs, 50 mph, 100 feet
Non-lethal	Should not adversely impact occupants wearing seatbelts or impart more than minimal damage to the targeted vehicle	Threshold = Objective
Weight	Two (2) man portable	Threshold = Objective
Employment	Able to be attached to remote deployment device on both the right and left side of the net.	Threshold = Objective
Employment	Can be setup in a standby mode enabling vehicle traffic flow with the ability to be deployed remotely (providing standoff between the operator and targeted vehicle) and by hand	Threshold = Objective

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**Request For Proposals Anticipated: NOV 2017**

Approved for public release; distribution is unlimited. PAO log # 656-17





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# Single Net Solution w/ Remote Deployment Device (SNS/RDD)



## Objective/ Mission

To complete the procurement of a Single Net Solution with Remote Deployment Device capable of remote activation and capable of stopping vehicles weighing up to 22,000 pounds.



## Capability Gaps Addressed

The SNS-RDD will mitigate the following capability gaps identified as the top two priorities in the Joint Capability Document (JCD) for Joint Non-Lethal Effects (JNLE) the need to stop both a small and large vehicle at standoff from checkpoints & access control points

Capability Production Document (CPD) approved 22 November 2011 Version 2.5 CARDS # 1992



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# Near Term Nonlethal Systems



## 12GA Extended Range Nonlethal Munition

Key Required Capability	Threshold	Objective
Platform	Mossberg 500/590, M26 (Modular Accessory Shotgun System)	Threshold = Objective
Marking Visibility	The cartridges shall be capable of marking the intended target in a non-red or non-orange color throughout the operational temperature range. The marked target shall be visible by day at a range of 50 meters or greater.	Must be visible by day/night at ranges equal to or greater than 75m and non-red / non-orange in color
Engagement Range	Must have an effective engagement range of 30 - 50 meters	=< 10 meters to => 75 meters
Probability of Hit (P(h))	Must have a P(h) equal to or greater than 0.5 from 30 - 50 meters	0.5 from 10 - 75 meters
Temperature	Ability to withstand operating temperatures ranging from 0°F to 140°F	Threshold = Objective
Effect	Blunt force trauma to stop, confuse, disorient, or deter a potential threat	Threshold = Objective



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## M1116, 12 Gauge Extended Range Non Lethal Cartridge



### DESCRIPTION:

- This is a USA Soldier Enhancement Program (SEP) in which 12 Gauge Non-Lethal Blunt trauma munitions are capable of providing non-lethal marking capabilities at an effective range of 30 to 50 meters (T), and an objective range of 10 to 75 meters.

### APPROACH:

- To field a 12 Gauge Non Lethal round, which expands the range and standoff capability of the existing 12 Gauge NL Point Cartridge (AA51)
- Provide Blunt impact/markings

### DEFINE REQUIREMENTS FOUNDATION:

- Operational Requirements Document Approved 19 Jan 2005, Enhanced 12 Gauge Non Lethal Rounds Cost Analysis Requirements Document 1983

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# Near Term Nonlethal Systems



## Acoustic Hailing Device (AHD)

Key Required Capability	Threshold	Objective
Voice Transmission -	Clear, intelligible voice transmission with 88 dBA background noise present at target location of 300 meters range	At 1000 meters
Directionality	Acoustic beam width (defined as 3dB down points) relative to the axis of transmission at 300 meters not greater than $\pm 77.5$ meters ( $\pm 15^\circ$ ).	At $\pm 5$ meters
Warning Tones	Warning tone clearly audible at 300 meters, with 88 dBA background noise present at target location of specified range	At 1000 meters
Power Consumption	Operate at low power for not less than 4 hours using a rechargeable and/or vehicle/vessel battery. If supplied with its own rechargeable battery, it shall be tested using that, followed by the vehicle battery, if required	Not less than 8 hours
Operator Sound Pressure Level	Max sound pressure level (SPL) at the operator's position shall not exceed 108 dBA	Threshold = Objective
Weight	Emitter head weight (including speakers and amplifier) not greater than 20.41 kilograms (45 lbs)	Not greater than 10.43 kilograms (23 lbs)
Power Input	Fully capable of operating with power input of 12 and 24 Volts DC and 110/120 and 220/240 Volts AC IAW MIL-STD-1275	Threshold = Objective
Cables and Connectors	All components shall interconnect/communicate via wired connections. System shall not transmit information wirelessly.	Threshold = Objective
Vehicle Mounting Kit	Shall include a vehicle mounting kit capable of interfacing with vehicles for mobile employment	Threshold = Objective
Tripod Mounting Kit	Shall include a tripod capable of stationary ground employment	Threshold = Objective
Visual Aiming	Provided with attached fixed aiming device to assist operator in orienting the device	an attached telescopic range finding device

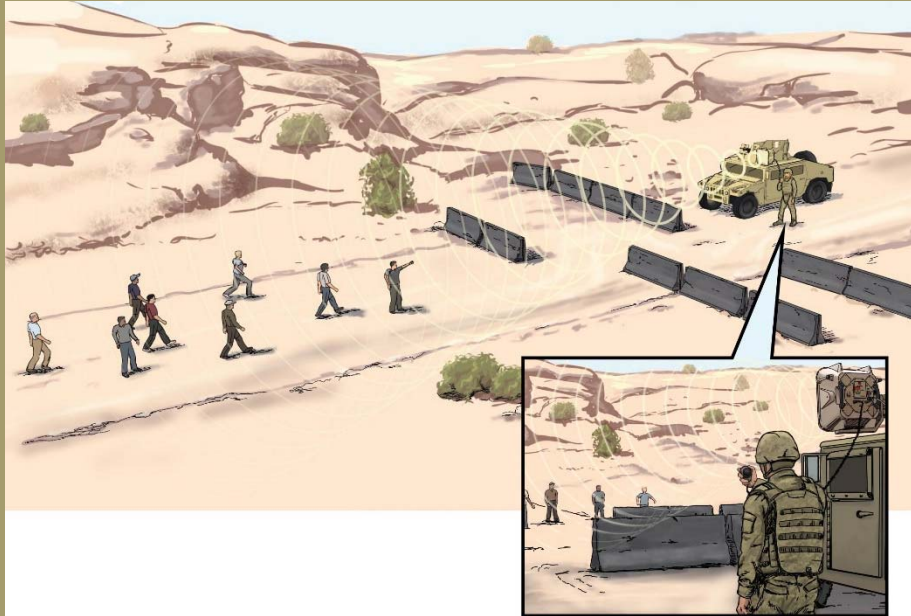
Request For Proposals Anticipated: NOV-DEC 2017





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# Acoustic Hailing Device (AHD)



Provides focused and intelligible voice commands at up to 300 meters (T) to identify and determine intent of targeted subjects

Capability Production Document  
(CPD) approved December 2009  
CARDS # 1989

## DESCRIPTION:

- Commercially available system that provides force protection & messaging capability via a focused, acoustic wave, highly directional transmitter. Emits intelligible voice and warning tones with clarity and authority in excess of 300 meters over land.
- Takes audio inputs from microphone, Phraselator, MP3 player, compact disc (CD) and other audio input devices.
- Non-lethal capability to inform, warn & direct actions of potentially hostile, but likely non-combatant personnel.
- Stationary (ground mounted) or mobile (vehicle mounted) applications for Military Police, Transportation & PSYOP units.



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# Near Term Nonlethal Systems



## Individual Nonlethal System

Key Required Capability	Threshold	Objective
System Weight	=< 8 lbs	= < 5 lbs
Minimum Range	=< 10 meters	= < 5 meters
Maximum Range	=> 100 meters	=> 150 meters
Semi Automatic Operation	5 targets within 30 seconds	(T) = (O)
Accuracy at a given Range	90% of rounds fall inside a 18x18 inch target @ 50 m	90% of rounds fall inside a 12x12 inch target @ 100 m

Capability Development Document (DRAFT): 4<sup>th</sup> Qtr FY 18



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# Variable Velocity Technologies



*(U) Notional Images/examples*

## **(U) OBJECTIVE:**

(U) A single NonLethal (NL) solution that will replace the current suite of NL munitions decreasing the current logistics and weight burdens. The capability will require a consistent NL effects on targets at varying distances across an extended range envelope.

## **(U) Benefits/Plan:**

- (U) Variable Velocity technologies have the potential to extend the operationally useful engagement envelope to remain NL close-in, but also deliver effects at extended ranges
- (U) Additional benefits potentially include reduced logistics burden due to one common weapon/round for a broad set of NL engagement ranges
- (U) FY13-FY18 (ongoing): Assessments of existing NL prototype technologies for test and demonstration at Army Expeditionary Warfighter Experiments (AEWE)
- (U) FY16-18 (ongoing): Investigation of Variable Velocity concepts and launch sub-systems to determine suitability of technologies to meet desired engagement ranges
- (U) FY18 and beyond: Continue evaluation of technologies and commercial market to identify concepts and developmental items that meet development goals. [Potential to invest in development/demonstration of items](#)



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# Directed Energy Investments & Applications



- **(U) Seek opportunities to invest in Directed Energy (DE) technologies when:**
  - (U) Conventional weapons technology (kinetic/chemical/explosive) cannot address a lethality gap (ie. NonLethal (NL) engine/vehicle/vessel stopping)
  - (U) DE technology can provide a more efficient/effective or safer solution than conventional systems
- **(U) Focus on NL/DE Weapons with reduced Size, Weight, and Power (SWaP) that minimize or preclude negative integration impacts to existing combat vehicles**
  - (U) Vehicle Occupancy, Carrying Capacity, Mobility
  - (U) Ability to execute the vehicle's primary mission
  - (U) Provide adjunct capabilities to existing vehicles & Avoid investments in DE/NL systems that require a new or "dedicated" vehicles

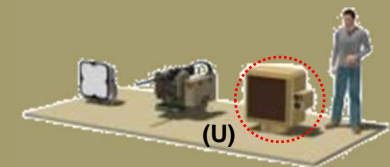
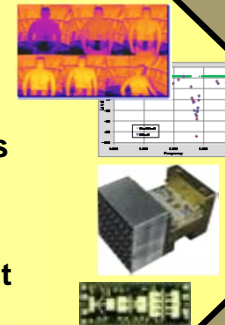
(U)

## Current vehicles with NL Capability



## S&T Investments

- SWaP-C Drivers
- Gan MMIC improvements
- Thermal/cooling
- Multi-Role applications
- Component Development
- Efficiency



**(U) S&T Goal is  
Adjunct Systems with  
reduced SWaP-C**







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# Solid State Active Denial Technology (SS-ADT)



## (U) Current Systems



ADS0



ADS2



ADS1



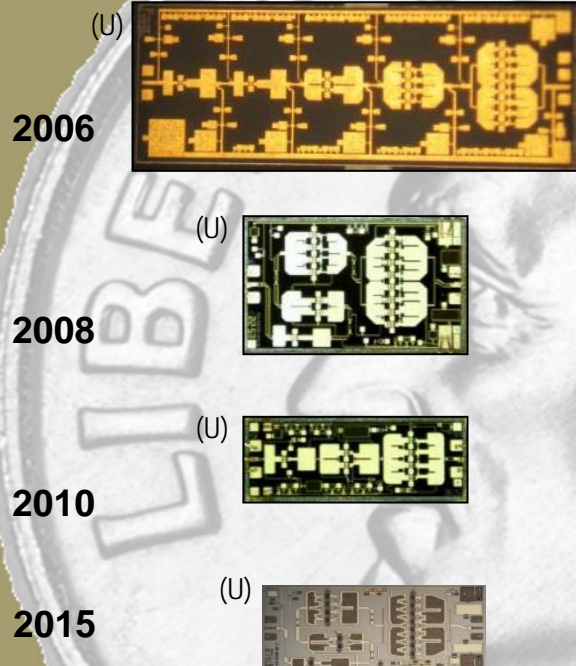
ADS1R

## (U) Solid State



(U) SS-ADT Skid Plate Demonstrator

Participation in AEWE18:  
Inform Requirements Development



## (U) JNLWD planned S&T in FY17-19:

- (U) GaN MMIC Increased Power and Power Added Efficiency (PAE)
- (U) Electronic-Steering Capability
- (U) Sub-Module prove-out

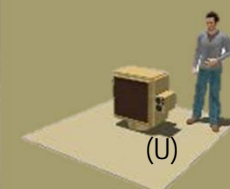
## (U) Future Solid State Systems



(U) SS-ADT Skid Plate Demonstrator



(U) Vehicle Mounted Conceptual Demonstrator



(U) "Tactical Size" ADS Concept

## (U) Army proposed S&T in FY20-23: (Pre-Decisional)

- (U) Opportunity for Vehicle Integration partnerships
- (U) Interest in Cooling and Power Source (LiOn) battery technologies



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# Summary of Collaborative S&T Opportunities



Army NL team focus and investments are focused on:

- Extended-Range Solutions
  - Improved Operational Envelope Solutions (closer min safe and greater max effective range from one launcher/round)
  - Non-Kinetic Vehicle Stopping solutions for potential replacement of FASCAM/VLAD
- Technology Enablers (looking for collaboration):
  - Variable Velocity technologies
  - Directed Energy for NL Vehicle Stopping and NL Repel for Ground Platforms
- Directed Energy Weapons (DEWs) for Non-Lethal applications must minimize or preclude negative integration impacts to existing combat vehicles



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# Malodorous Round



- REF assessing the ability to deter non-combatants from harassing tactical units on patrol or on a FOB security perimeter.
- Deterrent must be non-caustic and compliant with Chemical Weapons Convention (CWC). Vendor required to provide independent test data and supporting documentation.
- Deterrent delivered precisely against individuals at a range of 50 meters. Greater ranges desirable.
- Deterrent is persistent for up to 24 - 48 hours for tracing and tracking individuals.
- Method of delivery must have a low risk of injury to the non-combatant.
- Stand alone system.
- Any substance or residual can be easily cleaned or removed by friendly forces.
- POC: MAJ Stephen Cheng, [stephen.c.cheng2.mil@mail.mil](mailto:stephen.c.cheng2.mil@mail.mil)



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